



# Senior Drivers, Vision & Driving

## TEAM

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## Background

- Senior drivers over (70 years) have more accidents (RTA)
  - With increasing age vision decreases
  - Vision standards may predict senior driver performance. Current standards:
    1. visual acuity
    2. peripheral vision
    3. no double vision
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## Aim

To investigate if the current Austroad vision standards identify drivers at risk of unsafe driving practice.

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## Project method

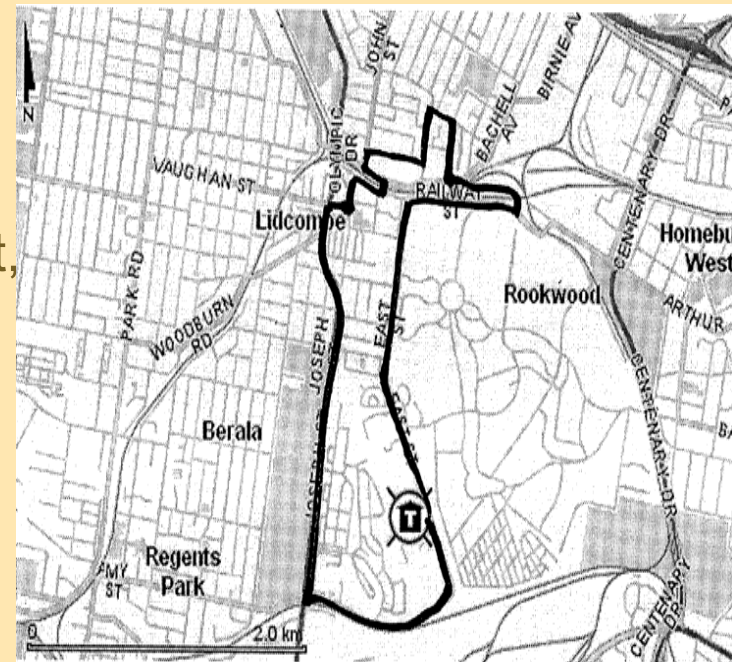
- 100 drivers - 60 to 85 yrs, mean 70.05 years;  
35 females, 65 males (population equivalent –RTA) ,  
76 with good vision, 24 with defects )
  - Completed consent process, questionnaire on preferred driving scenarios
  - **On-road** in local suburb (**vision skills unknown**)
  - Occupational Therapist off-road test of cognition & road rule knowledge
  - Orthoptist off-road vision test (sensory & motor)
  - Feed back
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## On-road assessment

Route - a set route involving -

- 3 roundabouts;
- unprotected turns 7 left, 5 right;
- turns at traffic lights 4 left, 1 right, 4 straight;
- lane change right 4, left 4;
- pedestrian crossing 5;
- 19 straight stretches;
- 4 hazards



Approximate time 20 minutes, 9 kms

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## Driving scale -Fail

1 = Fail: Austroad standards for vision not met.  
Habitual & hazardous errors with Driving  
Instructor intervention  
(no = 8)

2 = Full driving assessment recommended:  
Austroads standards for vision met. Habitual &  
hazardous errors with Driving Instructor  
intervention  
(no = 7)

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## Pass standard

3 = lessons recommended: habitual errors requiring remediation

(no = 13)

4 = pass: safe & legal driving, no intervention needed

(no = 72)

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# Vision standard 1. Visual Acuity

Acuity standard 6/12 one or both eyes  
(no 5)

2 errors allowed (Austroads)

Project results:

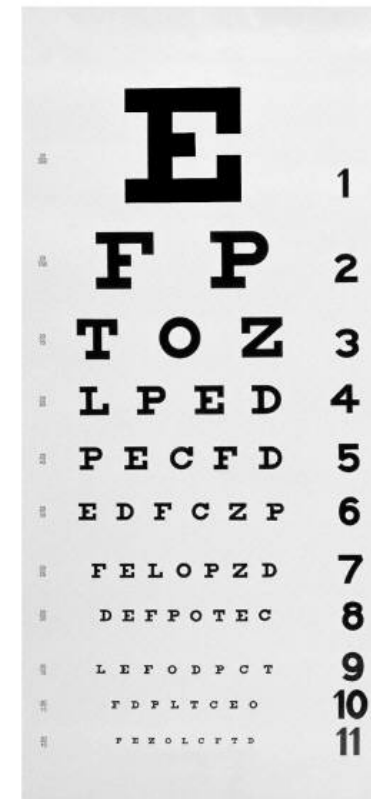
VA range both eyes 6/5 - 6/36 (mean 6/6)

4 drivers failed acuity criteria

( 1 = 6/24, 3 = 6/36)

Weak Spearman's correlation  
of acuity with age

(  $r_s = .365$ ,  $p < 0.001$  )





## Vision standard 2 – Peripheral Vision (Visual Field)

“120 degrees within 10 degrees above and below the horizontal midline, (no) hemianopia quadrantanopia, (no) other significant visual field loss (scotoma)” (Austroads).

Disease measure = monocular.

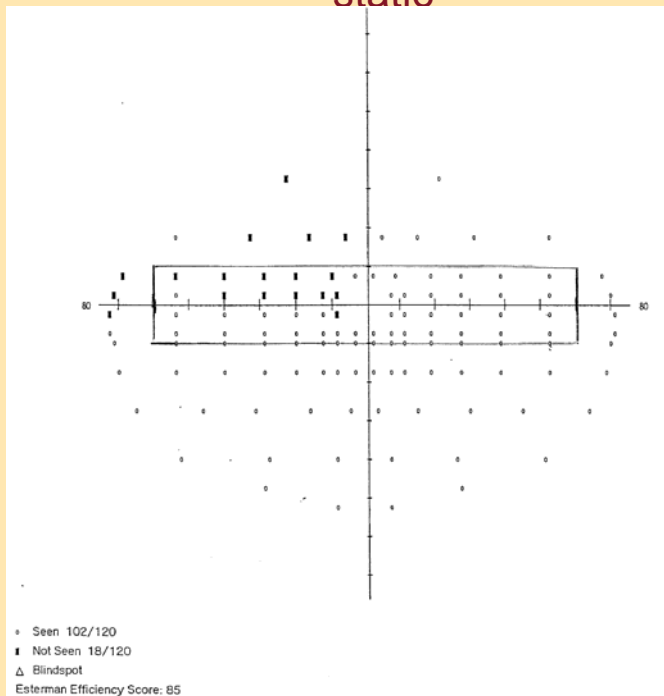
Drive test = binocular

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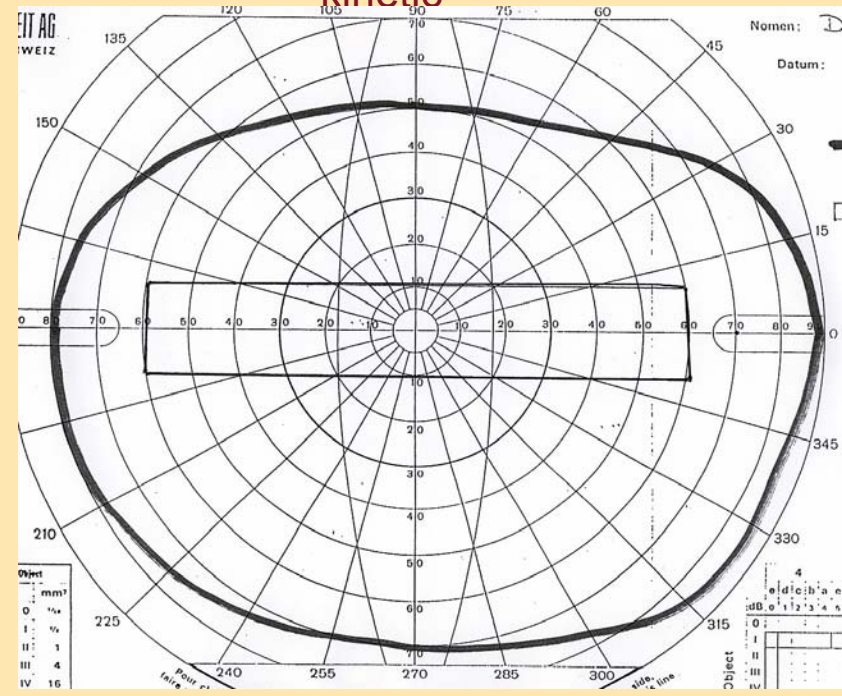


# Binocular peripheral vision – numeric field results

static



kinetic





# Case Studies

subj No.	Esterman (tot /120)	pass /fail "120"	Goldmann tot (total /2017)	pass /fail "120"	Drive score 1&2=F, 3&4=P
69	51	F	1317	F	F1
30	89	F	1420	F	P4
9	35	F	1679	P	F2 (health)
32	102	F	1684	P	F2 (sample)

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## Vision standard 3 - no diplopia

Standard :No double vision in the central area

10 drivers with squint  
2 drivers with diplopia:  
1 failed, 1 passed





## VISION STANDARD V DRIVER ON-ROAD OUTCOME

ON-ROAD SCORE	VISUAL ACUITY F= 4	Binocular Esterman	Binocular Goldmann	Diplopia (2)
Pass	0	10	9	1
Fail	4	7	3	1



# Discussion

## GENERAL

Same vision standards apply to all ages

Study numbers limited, select group but sex distribution mirrors RTA statistics

## VISION ISSUES for senior drivers

Translation of clinical results are subjective

VA when  $< 6/12$  better predictor, no compensation

Peripheral response suggests poor prediction, can compensate, possibly depends on associated skills





## Conclusion

Vision in some situations can predict poor driving skills – acuity.

Peripheral vision defects suggest the need for additional test procedures including on-road.

There is a need for a larger number of participants with vision loss to be tested.

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## Conclusion cont

- There is a need to investigate the value of other or combination of tests (vision and general tests) to examine if there is a better predictor of safe driving skills in senior drivers.
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